

APPLICATION FOR
UNITED STATES LETTER PATENT
SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

Be it known that I, Vaughn L. Bauer, a citizen of the United States, having a postal address of 507 S. Wise Street, Paton, Iowa 50217 have invented new and useful SECTIONAL TOOLBAR FOR A PLANTER, of which the following forms the specification.

“SECTIONAL TOOLBAR FOR A PLANTER”

CROSS REFERENCE TO RELATED APPLICATIONS

Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable.

REFERENCE TO MICROFICHE APPENDIX

Not applicable.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to an agricultural device. More particularly the present invention relates to a planter toolbar comprising more than three sections, and is horizontally foldable.

Background Art

Fences are being removed in the corn belt. For this reason and because the acreage farmed by the typical farmer is increasing, field equipment, in particular planters, are

being built to cover more and more crop rows as the years go by. Roads, however, are not being significantly widened. Therefore, schemes for folding or rotating wide equipment have been devised for the purpose of transporting this large machinery on public roads.

An additional consideration is that farm ground is not perfectly flat. So a planter of significant width cannot be assembled on a rigid toolbar lest some of the row units be off the ground at times, and therefore, ineffective. Present-day planter toolbars have three sections for flexibility over uneven terrain. Difficulties arise in attempting to extend this to more than three sections.

Friesen et al., in U.S. Patent 5,113,956, disclose a forwardly folding, three section toolbar. A center section is held at a right angle to the tongue, while wing sections pivot on the ends of the center section. When in a field position, the wing sections are pivoted to be substantially collinear with center section. When in transport mode, the wings are pivoted to be substantially parallel to the tongue, and on either side, thereof.

A five-section implement toolbar is disclosed by Smith in U.S. Patent 6,089,329. The toolbar disclosed folds upwardly (vertically) when in transport mode, exhibiting a high ground clearance and the stresses resulting from carrying the weight of the wings on a pivot.

There is therefore a need for an implement toolbar having five or more sections that can be folded horizontally – forwardly or backwardly – for transport.

BRIEF SUMMARY OF THE INVENTION

An advantage of the present invention is the use of a five-section toolbar. Because farm fields are not perfectly planar, to ensure the planter units contact the soil, flexibility must be built into a planter toolbar. Ideally, each unit would “float,” such that it could be in contact with the soil, irrespective of the soil level for any other unit. A toolbar with only two units per section could provide this ideal flexibility, but at a high cost of complexity, maintenance, and reliability. A compromise is to divide the toolbar into as many sections as practical. For the present invention, that number of sections is more than three and, typically, five.

An additional advantage of the present invention is the horizontal (that is, within a substantially horizontal plane) folding of a five or more section toolbar for transport on public roads and through narrow gateways. The present invention uses a telescoping tongue similar or identical to the three-section toolbars, but has overcome the difficulty of the additional pivot points. When in transport mode, the wing sections are borne by the tongue. The tongue, in turn, is supported at its forward end by the tractor draw bar, and its rearward end by wheels situated near the rear end of the tongue. At the extreme ends of the toolbar, as well as at each sectional pivot point, a latch is provided for transferring the weight of the wing sections to the tongue. Wheels at each pivot point and at the extreme ends of the wings carry the weight of the wing sections when the implement toolbar is extended in its field position. Actuators between the wheels and the toolbar raise the toolbar relative to the wheels for folding. Once the wings have arrived in their forward positions, the wing sections are lowered so the latches carry their weight on the tongue and the wheels are raised off the surface.

Between each of the toolbar sections is a pivot point allowing the sections to be noncollinear with one another for the purpose of following the ground contour.

Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Fig. 1 is a perspective view of a planter;

Fig. 2 is a perspective view of a five-section toolbar;

Fig. 3 is a perspective view from the back of a latch for stabilizing a toolbar wing to a toolbar tongue;

Fig. 4 is a perspective view from the front of a latch for stabilizing a toolbar wing to a toolbar tongue;

Fig. 5 is a perspective view of a toolbar in a process of folding;

Fig. 6 is a perspective view of a toolbar in a folded configuration;

Fig. 7 is a perspective view, substantially from the front, of a five-section

toolbar showing its flexibility;

Fig. 8 is a perspective view, substantially from the back, of a five-section toolbar showing its flexibility;

Fig. 9 is a perspective view, substantially from the front, of a planter assembled on a five-section toolbar showing its flexibility;

Fig. 10 is a perspective view, substantially from the back, of a five-section toolbar assembled on a showing its flexibility;

Fig. 11 is a perspective view of the latches and the tongue of the five-section toolbar; and

Fig. 12 is a perspective view, substantially from the rear of the five-section toolbar in the folded and latched configuration.

DETAILED DESCRIPTION OF THE INVENTION

A complete planter **100** is shown in **Fig. 1**. The planter **100** is drawn by a tractor or other vehicle by its tongue **110**, which is telescopic and an integral part of the foldability of the planter for road transport, gate access, and storage.

A center wheel assembly **120** carries the weight of the tongue **110** and the center portion of the planter **100**. During transport, the center wheel assembly **120** carries all the weight carried by wheels on the planter.

Center wing wheel assemblies **130** support weight in between the tongue **110** of the planter **100** and the ends of the planter **100**.

End wing wheel assemblies **140** bear the weight of the ends of the planter **100**.

Planter units **150**, with containers carrying seed, and the components for opening the ground, dropping the seed, and compacting the soil around the seeds are shown lined up across the planter **100**.

Markers **160** provide a gage line for aligning the tractor and planter for each trip across the field.

The planter units **150** are removed in **Fig. 2** to clearly show the five section toolbar **200**.

A center section **210** is made up of three subsections. A center subsection **210a** remains substantially stationary relative to the tongue **110**. The two outer subsections **210b** pivot for folding, as will be explained, later. At each end of the center section **210** is a hinge assembly **310** (Figs. 3 and 4 show a hinge assembly for another part of the toolbar **200**, but the present hinge assembly is the same as shown) to which an inner wing section **220** is pivotally attached. When the planter **100** is in its field position, a hinge pin **320** lies substantially parallel to a direction of travel so the center section **210** and the inner wing sections **220** remain substantially in a substantially vertical plane throughout the allowed travel of the inner wing section **220** relative to the center section **210**.

Two outer wing sections **230**, one mounted on each end of the inner wing sections **220** by hinge assemblies **310**, provide additional length to the toolbar, while also providing necessary flexibility. The hinge pin **320** again lies substantially parallel to the direction of travel, and permits the outer wing sections **230** to flex relative to the inner wing sections **220** within a substantially vertical plane.

The process for transport and storage is begun as shown in Fig. 5. During the folding process, the tongue assembly **110** telescopes. The inner tongue portion **520** slides forward and out of the outer tongue portion **530**. The telescoping of the tongue assembly **110** causes the wing sections **220**, **230** at each end of the center section **210**, as well as the two outer center subsections **210b** to rotate in a substantially horizontal plane about pivot points **510** in the center section **210** until they are approximately parallel to the tongue assembly **110** as shown in Fig. 6. The inner wing section **220**, the outer wing section **230**, and the outer center subsection **210b** at each end remain substantially in a substantially vertical plane during the process. A latch assembly **330** is used to stabilize the wing sections **220**, **230** with the tongue **110** upon completion of the folding which is illustrated in Fig. 6 where the toolbar **200** is completely folded and latched. A notch **340** in the latch assembly **330** engages the inner tongue portion **110** when latched. The latch assembly **330** thereby fits over the top of the inner tongue portion **520** in the latched position thereof.

The toolbar **200** of the present invention could also be foldable by rotating the wing

sections **220, 230** backward instead of forward. Such a rear-folding embodiment is not disclosed herein, but is contemplated by the claims because such alternate embodiment could easily be accomplished by a reversal of parts where needed.

During the folding process of the embodiment shown in the drawings, wheel hydraulic cylinders **410** (**Fig. 4**) at the wing wheel assemblies **130, 140** raise the wing sections **220, 230** relative to the wing wheel assemblies **130, 140**. Once the wings **220, 230** have rotated completely from the **Fig. 5** position to the **Fig. 6** position, the wheel hydraulic cylinders **410** lower the wing sections **220, 230** relative to the wing wheel assemblies **130, 140**, thus engaging the latch assembly **330** to the tongue **110** wherein the notch **340** in the latch assembly **330** engages the inner tongue portion **520** by fitting over and down onto the inner tongue portion **520** which is directly behind the hitch.

Views of the five-section toolbar **200** in its folded configuration are shown in **Figs. 11 and 12**. In particular, the latch assemblies **330** are shown with the toolbar tongue **110** engaged in their notches **340**. The toolbar **200** is completely folded and the wings **220, 230** stabilized to the tongue **110** for transport or storage.

A main advantage of the five-section toolbar **200** is shown in **Figs. 7–10**. Because fields are not, in general, planar, a planter and other field equipment must flex to follow the existing ground contours. The toolbar **200** is shown in a flexed shape from in front and above in **Fig. 7** and in **Fig. 9** it is shown flexed and with the planter units **150** attached to emphasize that the implement must contact the soil surface.

The toolbar **200** is shown from a rear corner in **Figs. 8 and 10**. Again, the toolbar **200** is flexed to indicate an advantage of the five-section design over the prior art. With planter units **150** attached, the need for flexing is obvious: so the units are in contact with the ground.

The above embodiment is the preferred embodiment, but this invention is not limited thereto. It is, therefore, apparent that many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.